

What is claimed:

1. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
 - 3 a dielectric film formed on a semiconductor substrate;
 - 4 a SOI film comprising single crystal Si formed on the dielectric layer film;
 - 5 a gate dielectric film formed on the SOI film;
 - 6 a gate electrode formed on the gate dielectric film; and
 - 7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 0.6 V is used,
10 a thickness of the SOI film is 0.084 μm or greater and 0.094 μm or smaller, and an
11 impurity concentration of the SOI film is $7.95 \times 10^{17}/\text{cm}^3$ or greater and $8.05 \times 10^{17}/\text{cm}^3$ or
12 smaller.

1. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
 - 3 a dielectric film formed on a semiconductor substrate;
 - 4 a SOI film comprising single crystal Si formed on the dielectric layer film;
 - 5 a gate dielectric film formed on the SOI film;
 - 6 a gate electrode formed on the gate dielectric film; and
 - 7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 0.6 V is used,
10 a thickness of the SOI film is 0.089 μm or greater and 0.099 μm or smaller, and an
11 impurity concentration of the SOI film is $8.95 \times 10^{17}/\text{cm}^3$ or greater and $9.05 \times 10^{17}/\text{cm}^3$ or
12 smaller.

1 3. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,

9 wherein, when a power supply voltage of 0.6 V is used,

10 a thickness of the SOI film is 0.093 μm or greater and 0.103 μm or smaller, and an
11 impurity concentration of the SOI film is $0.095 \times 10^{18}/\text{cm}^3$ or greater and $1.005 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 4. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:

3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,

9 wherein, when a power supply voltage of 0.6 V is used,

10 a thickness of the SOI film is 0.096 μm or greater and 0.106 μm or smaller, and an
11 impurity concentration of the SOI film is $1.095 \times 10^{18}/\text{cm}^3$ or greater and $1.105 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 5. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 0.6 V is used,
10 a thickness of the SOI film is 0.100 μm or greater and 0.110 μm or smaller, and an
11 impurity concentration of the SOI film is $1.195 \times 10^{18}/\text{cm}^3$ or greater and $1.205 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 6. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 0.8 V is used,
10 a thickness of the SOI film is 0.068 μm or greater and 0.078 μm or smaller, and an
11 impurity concentration of the SOI film is $7.95 \times 10^{17}/\text{cm}^3$ or greater and $8.05 \times 10^{17}/\text{cm}^3$ or
12 smaller.

1 7. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 0.8 V is used,
10 a thickness of the SOI film is 0.074 μm or greater and 0.084 μm or smaller, and an
11 impurity concentration of the SOI film is $8.95 \times 10^{17}/\text{cm}^3$ or greater and $9.05 \times 10^{17}/\text{cm}^3$ or
12 smaller.

1 8. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 0.8 V is used,
10 a thickness of the SOI film is 0.078 μm or greater and 0.088 μm or smaller, and an
11 impurity concentration of the SOI film is $0.095 \times 10^{18}/\text{cm}^3$ or greater and $1.005 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 9. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,

9 wherein, when a power supply voltage of 0.8 V is used,
10 a thickness of the SOI film is 0.083 μm or greater and 0.093 μm or smaller, and an
11 impurity concentration of the SOI film is $1.095 \times 10^{18}/\text{cm}^3$ or greater and $1.105 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 10. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,

9 wherein, when a power supply voltage of 0.8 V is used,
10 a thickness of the SOI film is 0.087 μm or greater and 0.097 μm or smaller, and an
11 impurity concentration of the SOI film is $1.195 \times 10^{18}/\text{cm}^3$ or greater and $1.205 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 11. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 1.0 V is used,
10 a thickness of the SOI film is 0.057 μm or greater and 0.067 μm or smaller, and an
11 impurity concentration of the SOI film is $7.95 \times 10^{17}/\text{cm}^3$ or greater and $8.05 \times 10^{17}/\text{cm}^3$ or
12 smaller.

1 12. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 1.0 V is used,
10 a thickness of the SOI film is 0.063 μm or greater and 0.073 μm or smaller, and an
11 impurity concentration of the SOI film is $8.95 \times 10^{17}/\text{cm}^3$ or greater and $9.05 \times 10^{17}/\text{cm}^3$ or
12 smaller.

1 13. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 1.0 V is used,
10 a thickness of the SOI film is 0.068 μm or greater and 0.078 μm or smaller, and an
11 impurity concentration of the SOI film is $0.095 \times 10^{18}/\text{cm}^3$ or greater and $1.005 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 14. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 1.0 V is used,
10 a thickness of the SOI film is 0.072 μm or greater and 0.082 μm or smaller, and an
11 impurity concentration of the SOI film is $1.095 \times 10^{18}/\text{cm}^3$ or greater and $1.105 \times 10^{18}/\text{cm}^3$
12 or smaller.

1 15. A semiconductor device to be used for a CMOS inverter circuit, the
2 semiconductor device comprising:
3 a dielectric film formed on a semiconductor substrate;
4 a SOI film comprising single crystal Si formed on the dielectric layer film;
5 a gate dielectric film formed on the SOI film;
6 a gate electrode formed on the gate dielectric film; and
7 a diffusion layer for source/drain regions formed in source/drain regions of the SOI
8 film,
9 wherein, when a power supply voltage of 1.0 V is used,
10 a thickness of the SOI film is 0.076 µm or greater and 0.086 µm or smaller, and an
11 impurity concentration of the SOI film is $1.195 \times 10^{18}/\text{cm}^3$ or greater and $1.205 \times 10^{18}/\text{cm}^3$
12 or smaller.